Evaluating Herbicides for the Control of Multiflora Rose and Autumn Olive in Eastern Ohio

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Abstract

Invasive plants cause billions of dollars annually in damage, displace desirable plants, and reduce available land area for livestock grazing. Multiflora rose and autumn olive are two such species prevalent across the Eastern United States. Originally introduced for livestock containment and erosion control, these plants have become widespread, resulting in reduced animal grazing. The Eastern Agricultural Research Station (EARS) is located in Southeast Ohio and is owned by The Ohio State University. Much of the more than 2,000 acres has a history of surface mining and was reclaimed with the planting of multiflora rose and autumn olive. These plants have invaded significant portions of the property and have reduced land available to support the commercial beef research herd. Our study included a replicated trial of multiflora rose and autumn olive plants. We categorized plants into small and medium/large sizes across the study area. Six herbicide treatments were applied to plants using a handheld sprayer. Herbicide treatments were applied randomly in August and an assessment was completed approximately six weeks to rate effectiveness of the applications as compared to the control plants. There were four replicates per treatment. The initial results of the first year of the study indicate each of the products tested provided acceptable control of the treated plants.

Introduction

According to the Noble Research Institute (2020), invasive plants displace desirable plant species, resulting in lower forage quality and quantity and reduced animal performance. Fuller and Mangold (2017), Montana State University, reported invasive species cause an estimated $137 billion annually, and $34 billion of this amount is attributed to non-native invasive species. Multiflora rose was introduced to the United States in the 1860s and autumn olive was introduced to the United States in the 1830s. In the 1930s, the Soil Conservation Service (presently the Natural Resources Conservation Service) promoted the use of mutiflora rose to prevent soil erosion and as a "living fence" for livestock containment. State and federal agencies also encouraged the planting of multiflora rose for wildlife enhancement. It is listed as a noxious weed in several states, including Ohio, Pennsylvania, West Virginia, and New Jersey. Autumn olive was promoted for many of the same reasons as multiflora rose. It has been used extensively in mine reclamation because of its ability to tolerate poor soil nutrient conditions and to change soil nutrient conditions by fixing atmospheric nitrogen. Multiflora rose and autumn olive are prevalent throughout the eastern United States. Both plants have prolific growth habits and result in reduced pasture and grazing land if not managed.

Methods

The Eastern Agricultural Research Station (EARS), owned by The Ohio State University, served as the study site for this project. Located in Southeast Ohio, EARS encompasses over 2,000 acres of land. Much of this property, 1,325 acres, includes former and active coal mining. Coal mine reclamation has been a focus of research at this site since the 1990s. As part of the reclamation, multiflora rose and autumn olive were established and have consumed acres of land, limiting beef cattle grazing. Our study included a replicated trial of multiflora rose and autumn olive plants. We categorized plants into small and medium/large sizes across the study area. Multiflora rose plants with a height of less than three feet were considered small, while those more than three feel tall were considered medium/large. For autumn olive, plants under five feet were considered small, while those over five feet were considered medium/large. Herbicides were applied to plants using a handheld sprayer. Treatments are listed in Tables 1 and 2. Herbicide treatments were applied randomly in August and an assessment was completed approximately six weeks post-treatment to rate effectiveness of the applications as compared to the control plants. Plants were scored as previously described by Loux et al. (2005) using a scale of "1" to "4" where 1=no regrowth; 2=slight regrowth; 3=moderate regrowth; and 4=extensive regrowth. There were four replications per treatment. Each treated plant was identified with GPS coordinates for future monitoring. Untreated control plants were available for comparison.

Multiflora rose

Table 1. Product and application rate applied to multiflora rose plants

Product Chemical Name	Product Trade Name	Application Rate
Dicamba and 2,4-D	Weedmaster	1%
Triclopyr	Garlon 3A	1.5%
Dicamba and 2,4-D and Triclopyr	Weedmaster + Garlon 3A	1% + 1%
Metsulfuron Methyl	Cimarron Plus	1.5 oz./100 gallons of water
Aminpyralid Potassium and Metsulfuron Methyl	Chaparral	3.3 oz./100 gallons of water
Aminpyralid Potassium and Triclopyr	Chaparral + Garlon 3A	3.3 oz. + 1%

Autumn olive

Table 2. Product and application rate applied to autumn olive plants

Product Chemical Name	Product Trade Name	Application Rate
Triclopyr	Garlon	3%
Triclopyr and Dicamba and 2,4-D	Garlon + Weedmaster	2% + 2%
Triclopyr and Metsulfuron Methyl and Chlorsulfuron	Garlon + Cimarron Plus	2% + 2 oz./100 gallons of water
Triclopyr and Potassium Salt and Metsulfuron Methyl	Garlon + Chaparral	2% + 3.3 oz./100 gallons of water
Dicamba and 2,4-D and Potassium Salt and Metsulfuron Methyl	Weedmaster + Chapparal	2% + 3.3 oz./100 gallons of water
Triclopyr and Dicamba and 2,4-D	Garlon + Weedmaster	2% + 1% + 2 oz./100 gallons of water

Results and Discussion

While significant research has been conducted on the control of multiflora rose, much less has been done with autumn olive. Our concerns on the difficulty of controlling autumn olive led us to use a more aggressive treatment than used on multiflora rose. Regardless of plant size or treatment applied, the initial results (six weeks post-treatment) were positive. All products applied achieved a rating of "4" for both small and medium/large multiflora rose and autumn olive plants.

Figure 1. Initial assessment prior to herbicide application. (Credit: C. Martin)

Figure 2. Mixing herbicides for application. (Credit: C. Martin)

Figure 3. Multiflora rose six weeks following herbicide treatment. (Credit: C. Zoller)

Figure 4. Autumn olive six weeks following herbicide treatment. (Credit: C. Zoller)

Conclusions and/or Implications

While initial treatments appear to have been effective, continued monitoring is necessary to determine treatment efficacy. Additional observations and ratings will be conducted in 2023. The use of GPS coordinates will allow us to collect data on resprouting that may occur after winter dormancy. If the effectiveness of these treatments follows through with permanent control of the treated plants, we could consider trials with reduced application rates. Additionally, other application methods should be evaluated. A trial with application of dormant season treatments will be applied to new areas of non-treated plants and evaluated beginning this winter.

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